



CENTRAL UNIVERSITY OF HIMACHAL PRADESH

[Established under the Central Universities Act 2009]
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Syllabus for PhD entrance test

Waste/carbon management and toxicology

Solid waste, Biodegradable, Non Biodegradable, Hospital and Pharmaceutical, Radioactive waste, Change in carbon pools, management plans are focused on (a) minimizing emission (b) maximizing environmentally sound reuse, reduce and recycling; (c) effective treatment and (d) converting carbon into valuable products with atom economy. Chemical and biological methods for carbon management, Modification in carbonic anhydrase (CA).

Toxic Properties of Chemical Substances, pathway of entry; detoxication, bioactivation. Physical properties of toxic and hazardous waste (vapour pressure, Vapour density, solubility etc), Toxic and hazardous characteristic various organic chemicals, Cancer-Causing Chemicals, Concept of carcinogenesis, Mechanism of chemical carcinogens, Human carcinogens, Toxic, and Flammable Gases, Insecticides, Asbestos, Flyash, Ozone and PAN pesticides, Chemical and Biological agents including warfare Agents. Necessity and viability of the methods of green chemistry to the chemical sciences and related disciplines, use of alternative feedstocks or starting materials, reagents, solvents, target molecules, and catalysts.

Geology /Geophysics

Modern theories on the origin of the Earth, Internal structure of Earth, fundamental characteristics of crust, mantle, core; different types of seismic waves and their path of propagation, Theory of Plate tectonics and its implications in understanding mountain building and sea floor spreading processes, Formation of oceans, continents and mountains, Distribution of earthquake and volcanic activity across the globe, How do earthquake occurs, cause intensity and magnitude, seismic hazard map of India, Causes, and impact of landslides, Causes of Floods and Flood prone areas of India, Droughts and their causes, causes of volcanoes. Introduction to rocks and minerals. Different types of rocks and their characteristics, Rock cycle, water cycle. Fundamentals on rock-forming minerals; weathering and erosion of rocks and minerals. Age of Earth and basic information on life and evolution Geological Time Scale and rock record. Major Geological events. Land-ocean interaction and biogeochemical cycling, Water cycle and availability of water. Economics of water. Physical work of river, wind, glacier and lake. Exploration geophysics and their applications in geology.

Ecology, Biodiversity and Environmental Microbiology Section

Ecology- Scope, Subdivisions, major landmarks in Ecology, Organisms and Environment-Holocoenotic nature of environment; biotic and abiotic components. Population characteristics; population dynamics and concept of carrying capacity; Regulation of population growth, Community concept, community characteristics, species diversity α , β and γ ; concept of ecological niche- types, ecotone & edge effect, Ecological succession-concept, causes and trends; Basic types of succession, General process of succession, Ecosystem Development, concept of climax, Biome. Ecosystem structure and functions; primary production.

Biodiversity- Genetic, Species and Ecosystem Diversity; Measuring biodiversity-Alpha, Beta and Gamma diversity, Reasons for biodiversity richness in tropics, Concept of precious genetic library, Biodiversity and human health, Brief account of plant-derived substances developed into valuable drugs, Overview of herbal extract industry in India. Diversification through time, distribution of biodiversity, Biodiversity hot spots- definition, brief account of biodiversity hot spots of India; Important terms-Vulnerable, Endangered, critically endangered, Present scenario of Biodiversity and wildlife conservation in India; National Parks, Biosphere Reserves and sanctuaries; Keystone species in conservation strategy, Endangered wildlife special projects-Tiger, Gir-Lion and elephant projects, National Biodiversity Authority; International approaches for conservation of Biodiversity- IUCN.

Microbial Ecology- Structural and functional aspects of viroids, prions, Viruses and Bacteria, Microbes and sustainable agriculture, Microbial interactions, quorum sensing.

Atmospheric Science

Vertical Structure and Composition of the Earth's Atmosphere: Chemical Composition, The State of the Atmosphere, Atmospheric Density and Pressure, Hydrostatic Balance

Atmospheric Thermodynamics: The Ideal Gas Law and First Law of Thermodynamics, Concept of Air Parcel and Lapse Rates Atmospheric Stability Mixing Height and Inversion

Atmospheric Energy Balance : Electromagnetic Radiations, Black Body Radiation, The Solar Constant and the Budget of Solar Radiation, Terrestrial Radiation, The Earth's Radiative Energy Balance, Green House Effect

Atmospheric Chemistry: Thermochemical and Photochemical Reactions, Chemistry of Stratosphere, Stratospheric Ozone Depletion, Chemistry of Troposphere, Acid Rain, Atmospheric Aerosols, Atmospheric Trace Gases

Atmospheric Dynamics: Pressure Belts and Winds, Pressure Gradient Force, Coriolis Force, Centrifugal Force, Friction, Global Circulation

Glaciology, Introduction to Earth Processes:

Introduction to Earth Science , Origin of Earth, Homogeneous and differentiated earth, Different mineral groups, Geomorphology: Continental Drift hypothesis, Theory of Plate tectonics, Mountain building and sea floor spreading processes and basic oceanography.

Glacier basics, Glaciers and climate change, Status of Indian Himalayan glaciers, Glaciations, Glacier systems, Structure and morphology of glaciers, Glacial erosion, Landscape evolution and different glacial landforms, Glacier Hazards, Glacier Mass Balance and Processes, Glacier and water resource, Glacial hydrology, Methods for determining glacial runoff, Glacial remote sensing, Glacier Hazard monitoring, Different instruments used for studying glacier fluctuations, Introduction to glacier modelling, A review of glaciological work in Polar region and Indian Himalaya.

Nano technique and environment

Properties of materials & nanomaterials, Scanning and Transmission electron microscopy, X-ray diffraction, X-ray Photoelectron spectroscopy, Energy dispersive X-ray analysis, Atomic force microscope, Raman Spectroscopy, UV-visible spectroscopy and Photoluminescence spectroscopy, chemical and biosensors, hydrogen generation and storage, hybrid energy cells.

Parameters for monitoring,,Environmental Divisions, Natural Cycles, Basic of environmental chemistry including chemistry of air water and soil. Principles of Natural Resource Management , Environmental Risk Assessment, Law of Motion, Work, Energy and Power, Gravitation; Gas Laws, Thermodynamics.